

LISTING OF THE CLAIMS

The following listing of claims supersedes all previous listings of claims in connection with this application.

LISTING OF CLAIMS

1. (Currently Amended) A method for reactor simulation, comprising:

receiving, by a computer processor, user input including values of one or more design input variables previously used in creating an existing response surface, the response surface defining relationships between the design inputs and operational outputs of at least one or more aspects of a core design; and

generating, by the computer processor, a reactor simulation based on the existing response surface for the core design and the received user input.
2. (Previously Presented) The method of claim 1, further comprising: accessing the existing response surface for the core design from a database.
3. (Previously Presented) The method of claim 1, wherein the user input includes at least one of control blades positions over time, bundle types of fresh fuel, loading pattern of exposed fuel, and water flow through the reactor core.
4. (Original) The method of claim 1, wherein the operational outputs include at least one of critical power ratio (CPR), shutdown margin (SDM), maximum average planar linear heat generation rate (MAPLHGR), maximum fraction of linear power density (MFLPD), hot excess reactivity, radial and axial power peaking, peak fuel rod and bundle exposure, Uranium utilization

as measured by reactor energy output produced (in mega-watt-days) per kilogram of Uranium-235 loaded.

5. (Original) The method of claim 1, wherein the generating step generates the reactor simulation in real time.

6. (Previously Presented) The method of claim 1, wherein the existing response surface includes information defining a plurality of predictors, each predictor predicting one of the operational outputs based on one of the design inputs.

7. (Previously Presented) The method of claim 6, wherein the generating step uses one or more predictors associated with the user input to generate new operational outputs.

8. (Previously Presented) The method of claim 6, wherein each predictor is one of a second order polynomial and a linear function.

9. (Original) The method of claim 1, further comprising: providing feedback to the user on the generated reactor simulation.

10. (Previously Presented) The method of claim 9, wherein the providing step provides an old objective function value for the core design prior to receiving user input and a new objective function value for the core design after receiving user input.

11. (Original) The method of claim 10, wherein a same objective function is used to

determine the old and new objective function values.

12. (Original) The method of claim 11, wherein the same objective function is the objective function used to create the core design.

13. (Original) The method of claim 11, wherein the same objective function is a different objective function than an objective function used to create the core design.

14. (Previously Presented) The method of claim 10, wherein different objective functions are used to determine the old and new object function values.

15. (Original) The method of claim 9, wherein the providing step provides a worst case value for at least one of the operational outputs.

16. (Original) The method of claim 15, wherein the providing step provides the worst case value for one or more operational outputs selected by the user.

17. (Original) The method of claim 1, wherein the reactor being simulated is a boiling water reactor.

18. (Original) The method of claim 1, wherein the reactor being simulated is a pressure water reactor.

19. (Previously Presented) A method for obtaining a reactor simulation, comprising:
- identifying, using a computer processor, an existing response surface, the existing response surface defining relationships between design input and operational outputs of at least one or more aspects of a core design;
- inputting, using the computer processor, values of one or more of the design inputs;
- receiving, at the computer processor, one or more reactor simulation results for a reactor simulation of the existing response surface with the input values.
20. (Previously Presented) The method of claim 19, wherein the input values include at least one of control blades positions over time, bundle types of fresh fuel, loading pattern of exposed fuel, and water flow through the reactor core.
21. (Original) The method of claim 19, wherein the operational outputs include at least one of critical power ratio (CPR), shutdown margin (SDM), maximum average planar linear heat generation rate (MAPLHGR), maximum fraction of linear power density (MFLPD), Hot excess reactivity, radial and axial power peaking, peak fuel rod and bundle exposure, Uranium utilization as measured by reactor energy output produced (in mega-watt-days) per kilogram of Uranium-235 loaded.
22. (Original) The method of claim 19, wherein the receiving step receives the reactor simulation results in real time.
23. (Previously Presented) The method of claim 19, wherein the existing response surface includes information defining a plurality of predictors, each predictor predicting one of the

operational outputs based on one of the design inputs.

24. (Original) The method of claim 23, wherein each predictor is one of a second order polynomial and a linear function.

25. (Previously Presented) The method of claim 19, wherein the receiving step receives an old objection function value for the core design prior to inputting values of one or more design variables and receives a new objective function value for the core design after inputting values of one or more design variables.

26. (Original) The method of claim 25, wherein a same objective function is used to determine the old and new objective function values.

27. (Original) The method of claim 26, wherein the same objective function is the objective function used to create the core design.

28. (Original) The method of claim 26, wherein the same objective function is a different objective function than an objective function used to create the core design.

29. (Previously Presented) The method of claim 25, wherein different objective functions are used to determine the old and new object function values.

30. (Original) The method of claim 19, wherein the receiving step receives a worst case value for at least one of the operational outputs.

31. (Original) The method of claim 30, wherein the providing step provides the worst case value for one or more operational outputs selected by the user.

32. (Original) The method of claim 19, wherein the reactor being simulated is a boiling water reactor.

33. (Original) The method of claim 19, wherein the reactor being simulated is a pressure water reactor.

34. (Previously Presented) A method of operating a nuclear reactor, comprising:

operating a nuclear reactor using a reactor simulation generated using a computer processor based on an existing response surface for a core design and input received from a user, the input including values of design input variables used in creating the existing response surface, the existing response surface defining relationships between the design input variables and operational outputs of at least one or more aspects of the core design.

35. (Cancelled)

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END OF CLAIM LISTING